

FISHERY DATA SERIES NO. 71

SPORT EFFORT, HARVEST, AND ESCAPEMENT OF  
COHO SALMON *Oncorhynchus kisutch* IN SELECT  
KODIAK ISLAND ARCHIPELAGO STREAMS, 1987<sup>1</sup>

By

John B. Murray

Alaska Department of Fish and Game  
Division of Sport Fish  
Juneau, Alaska 99802

September 1988

<sup>1</sup> This investigation was partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under Project F-10-3, Job No. S-41-2, S-41-3.

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# ABSTRACT

Creel surveys were conducted during August and September on two streams and four bays in the Kodiak management area. A roving creel survey conducted on Buskin River 10 August through 2 October 1987 estimated sport anglers fished 8,394 angler hours and harvested 1,563 adult coho salmon *Oncorhynchus kisutch*. A similar survey conducted on Portage Creek 9 August through 20 September estimated sport anglers fished 1,972 angler hours and harvested 589 adult coho salmon. A creel survey conducted on Big Bay 8 August through 16 August and 26 August through 23 September 1987 estimated sport anglers fished 427 angler hours and harvested 378 adult coho salmon. Volunteer creel surveys conducted on Pauls Bay, Carry Inlet, and Shangin Bay during August and September estimated sport anglers fished a minimum of 729.0, 288.5, and 107.0 angler-hours; and harvested a minimum of 159, 106, and 92 coho salmon, respectively. Buskin River fish escapement counts, as determined by foot surveys and a weir operated from 22 April through 1 October 1987, totaled 105 emigrant steelhead *Salmo gairdneri*, 29 immigrant steelhead, 12,883 sockeye salmon *Oncorhynchus nerka*, 10,889 coho salmon, 79 chum salmon *Oncorhynchus keta*, and 30,392 pink salmon *Oncorhynchus gorbuscha*. Summaries of weir counts and biological data for fish sampled are presented.

KEY WORDS: coho salmon, *Oncorhynchus kisutch*, escapement, harvest, size and age, Shuyak, Afognak, Kodiak, Alaska.

## INTRODUCTION

### Buskin River

Buskin River (Figure 1) is centrally located in the urban area of Kodiak Island and receives more effort by anglers than any other water on Kodiak Island. The river contains steelhead/rainbow trout *Salmo gairdneri*, Dolly Varden *Salvelinus malma*, and all species of Pacific salmon *Oncorhynchus* sp. except chinook salmon *O. tshawytscha*. In 1986, it supported approximately 53% (24,219 angler-days) of the sport effort and 49% of the sport harvest (all species) for all Kodiak lakes and streams (Mills 1987). Buskin River salmon also support the largest personal use/subsistence fishery on Kodiak Island and a commercial fishery that targets primarily on pink salmon *O. gorbuscha* and coho salmon *O. kisutch* (Manthey et al. 1984).

The sport fishery targets anadromous Dolly Varden during April and May, sockeye salmon *O. nerka* and pink salmon from June through mid-August, and coho salmon from mid-August through mid-October. In 1983, approximately 18.5%, 59.7% and 21.3% of the sport effort (20,136 angler-days) occurred during these time periods, respectively (Murray 1984). Immigrant Dolly Varden are also caught from mid-summer through fall. The primary management concerns are for Dolly Varden, sockeye salmon, and coho salmon because the harvest of these fish by all user groups is thought to be high in relation to the population size.

In 1985, the Alaska Department of Fish and Game began a project to estimate the magnitude and composition of salmon, Dolly Varden, and steelhead returns to Buskin River (Murray 1986). The project consists of: (1) counting fish migrations through a weir; (2) estimating sport fish effort and harvest for the spring Dolly Varden and fall coho salmon fisheries; and (3) estimating the age-sex-size composition of Dolly Varden and coho salmon in both the sport harvest and spawning populations.

The objective of this report is to present data for Buskin River salmon and steelhead escapements and the sport harvest of coho salmon. Information pertaining to the personal use/subsistence and commercial fisheries are reported by Probasco et al. (in prep.). Results of that portion of the project pertaining to Dolly Varden are reported by Murray (1988).

### Northern Afognak Island and Shuyak Island Streams

Northern Afognak Island and Shuyak Island (Figure 2) are located approximately 31 km (50 mi) northeast of Kodiak, Alaska. The area is remote and accessible only by boat or amphibious aircraft; consequently, sport fish effort and harvest have been historically low. Sport fishing activities began to increase in the mid-1970s when the United States Forest Service commenced logging operations and began building a road complex that now transverses Afognak Island. Subsequent to these activities a logging camp was established at Portage Creek and three sport fish guides have established operating facilities within the area. A state park has been established with recreational facilities and nonguided sport fish interest

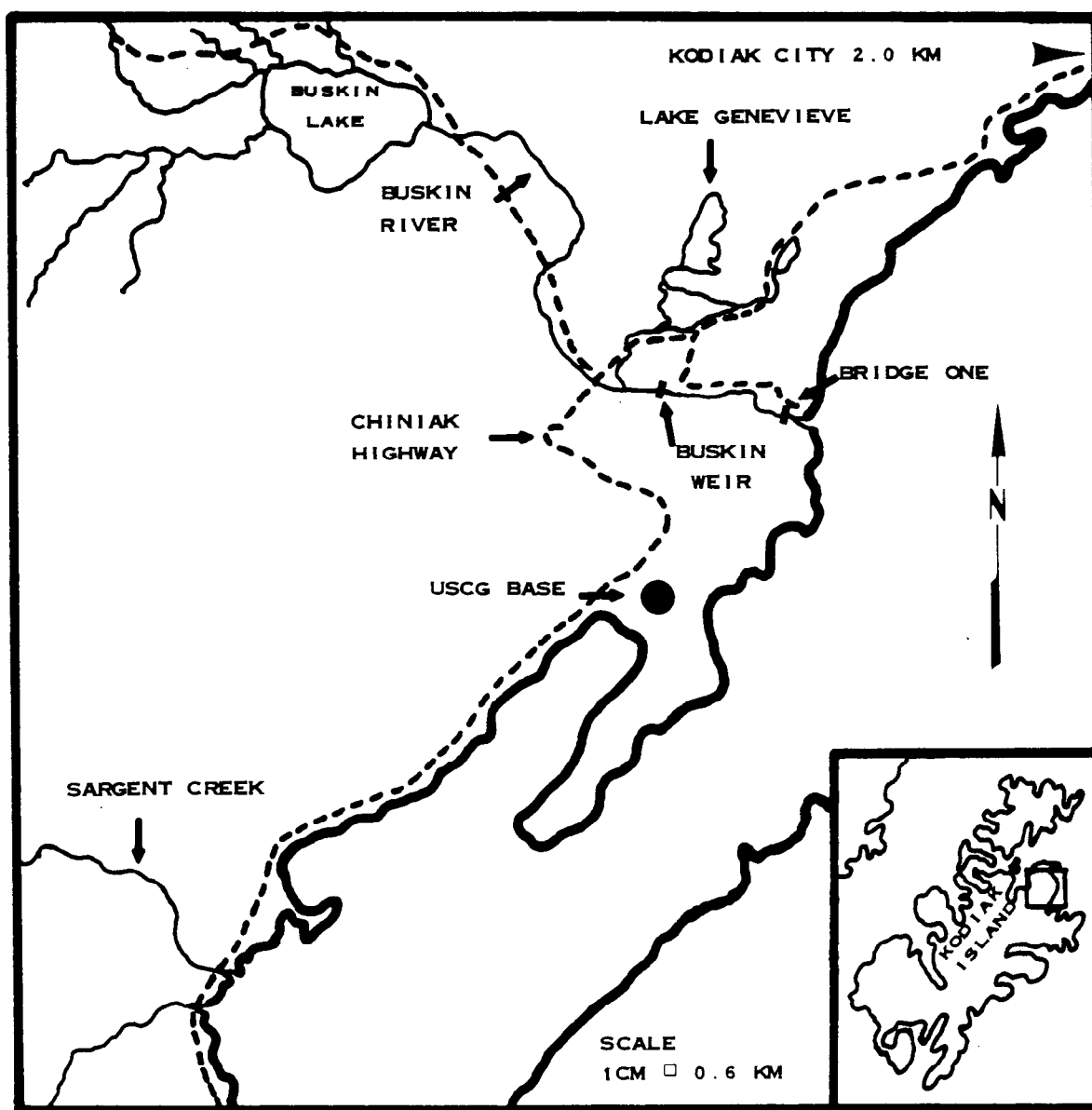


Figure 1. Location of Buskin River, Kodiak Island, Alaska.

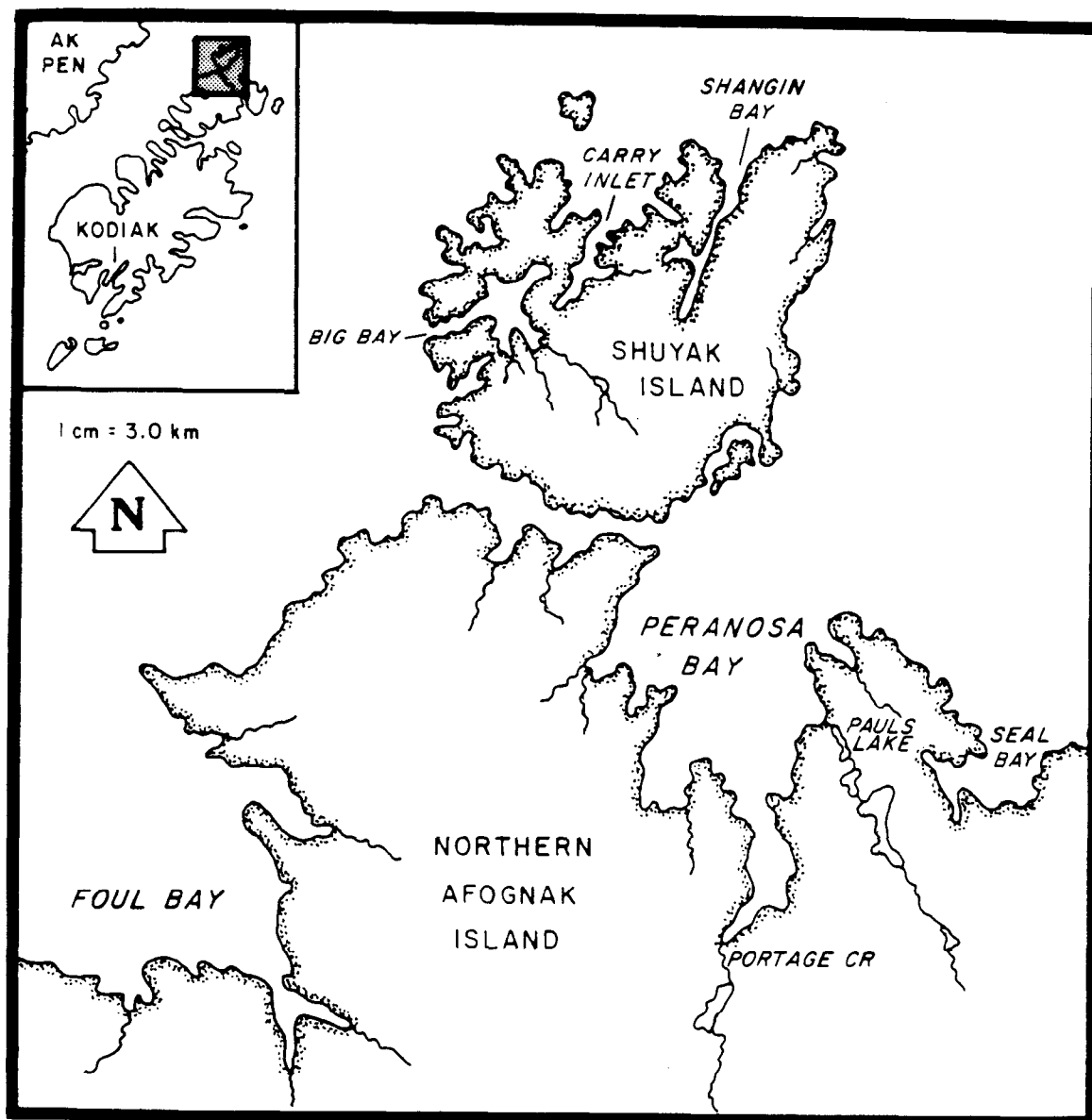


Figure 2. Location of Portage Creek and Pauls Lake on Northern Afognak Island and Big Bay, Carry Inlet and Shangin Bay on Shuyak Island, Alaska.

has increased. Personal observations indicate that the sport fishery targets primarily on coho salmon during August and September.

The Department has limited data regarding sport harvest in this area with minimal or no reported harvest from 1976-1986 (Mills 1979-1987). The objective of this report is to present the 1987 coho salmon sport harvest and effort for the major sport fishing areas on Northern Afognak Island and Shuyak Island. Estimates of commercial and subsistence harvest and the escapement of Pacific salmon have been reported annually by Manthey et al. (1985).

## METHODS

### Sport Fishery

#### Buskin River Study Design:

The Buskin River coho salmon sport fishery occurs in two distinct locations and time frames. Prior to 11 September, the fishery is restricted by regulation to that portion of the river below Bridge One (Figure 1). This is referred to as the early fishery. All of the effort in this fishery occurs at the tidal lagoon at the river mouth. After 10 September (referred to as the late fishery), the area restriction is lifted and the fishery occurs throughout the river. This late fishery occurs both above and below the weir (Figure 1), and fishery statistics are compiled separately for these locations. During 1987, anglers were permitted a daily bag limit of 2 coho salmon (20 inches or more in length) and could have two daily limits in their possession (ADF&G 1987).

A roving creel survey was conducted on Buskin River from 10 August through 2 October. Effort in angler-hours and coho salmon harvest were estimated for two time frames and three areas. The time frames were 10 August through 10 September and 11 September through 2 October. The fishing areas were: (1) the Bridge One fishery which occurred 12 August through 10 September; (2) below weir fishery 11 September through 2 October; and (3) above weir fishery 11 September through 2 October.

Angler counts were conducted following a stratified random sampling design. The fishing day was 16 hours long (0600-2200 hours) through 10 September and 14 hours long (0700-2100 hours) from 11 September through 2 October. Weekends were sampled separately from weekdays and each fishing day was stratified into four time periods: period A, 0600-0759 hours; period B, 0800-1159 hours; period C, 1200-1659 hours; and period D, 1700-2200 hours. After 10 September, periods A and D were reduced by 1 hour because of the shorter daylight hours. Sampling effort was allocated in proportion to the number of hours in each period during each fishery.

Angler counts were made by a roving creel survey clerk and took approximately 20 minutes to complete. Those counts were considered instantaneous counts (Neuhold and Lu 1957). Angler interviews were completed

trip interviews collected by monitoring the major access points and interviewing anglers as they departed.

The major assumptions necessary for the creel survey are:

1. Angler counts made during the same day and on consecutive days are independent.
2. No significant fishing effort occurs during the hours 2200-0600 prior to 11 September and during the hours 2100-0700 after 10 September.
3. Interviewed anglers are representative of the total angler population.
4. The number of anglers interviewed during a day is proportional to the effort on that day.
5. Fishing effort does not influence catch per unit effort.
6. Angler efforts and catches are normally distributed random variables.

#### Northern Afognak Island to Shuyak Island Study Design:

The Northern Afognak Island and Shuyak Island sport fishery for coho salmon occurs in five major areas: Portage Creek, Pauls Bay, Big Bay, Carry Inlet, and Shangin Bay (Figure 2). Most of the sport effort occurs in the tidal lagoon areas and/or at the head of the saltwater bays. Coho salmon first enter Afognak/Shuyak Island marine waters in early August and continue through late September. By mid-October, most coho salmon are in terminal spawning areas and approaching spawning maturity. The sport fishery occurs concurrently with the marine/estuary immigration.

During 1987, anglers were permitted a daily bag limit of 6 coho salmon (20 inches or more in length) and could have two daily limits in their possession (ADF&G 1987). By regulation, sport fishing was permitted the entire year in both fresh water and salt water.

A roving creel survey was conducted on Portage Creek from 9 August through 20 September and on Big Bay 8 August through 16 August and 26 August through 23 September to estimate sport effort in angler-hours and sport harvest of coho salmon.

Angler counts were conducted following a stratified random sampling design. At Portage Creek the fishing day was considered to be 14 hours in duration (0700-2100 hours). The fishing day was stratified into four time periods: A, 0700-0759 hours; B, 0800-1159 hours; C, 1200-1659 hours; and D, 1700-2100 hours. For the creel survey at Big Bay, the fishing day was also considered to be 14 hours in duration (0700-2100 hours). The fishing day was stratified into three time periods: A, 0700-1059 hours; B,

1100-0359 hours; and C, 1600-2100 hours. Sampling effort was allocated approximately proportional to the number of hours in each period.

Angler counts took approximately 40 minutes to complete on Portage Creek and 20 minutes to complete on Big Bay and were considered instantaneous (Neuhold and Lu 1975). Angler interviews were completed trip interviews collected by monitoring the major access points and interviewing anglers as they departed the fishery.

The major assumptions necessary for the creel surveys are identical to those previously described for the Buskin River except that no significant fishing effort occurs during the hours 2100-0700.

The Pauls Bay, Carry Inlet and Shangin Bay creel surveys were conducted from mid-August through mid-September to estimate the sport effort in angler-hours and the sport harvest of coho salmon. The census clerk traversed the fishing areas two to three times daily to interview sport fishermen. A majority of all anglers fishing throughout the survey period were contacted and interviewed to determine angler effort and sport harvest.

The major assumption necessary for the Pauls Bay, Carry Inlet, and Shangin Bay creel surveys was that nearly all anglers fishing during the survey period were contacted.

#### Buskin River, Portage Creek and Big Bay Data Collection:

During a selected sample period, a random starting time was selected to count the number of anglers and the remaining time was spent conducting angler interviews. Angler counts were conducted by walking, boating, or driving the length of the fishing area as quickly as possible and counting the number of people actively engaged in fishing. Only anglers who had completed fishing were interviewed. The following information was recorded during each interview: number of fish released by species, number of fish retained by species, and total hours fished (to the nearest one-quarter hour) and angler demographics (male/female, youth/adult, local/nonlocal, resident/nonresident, guided/unguided).

#### Pauls Bay, Carry Inlet and Shangin Bay Data Collection:

Census clerks traversed Pauls Bay and Carry Inlet via boat up to two or three times daily throughout the fishery and requested the following information from each angler: number of fish released by species, number of fish retained by species, total hours fished, angler demographics (same as for above sites) and type of lure (fly, spinner, or bait). Similar data were collected on Shangin Bay, but angler interviews were made approximately every other day. Most anglers were in the area for several days so data were collected for the days missed. Due to the nature of this survey some fly-in fishermen were not interviewed.

# Data Analysis:

Angler effort was calculated using a stratified random sample design (Schaeffer et al. 1979). Effort was estimated for each location and time frame as:

$$(1) \quad \hat{E} = \sum_{j=1}^4 H_j \bar{Y}_j$$

with variance

$$(2) \quad V(\hat{E}) = \sum_{j=1}^4 H_j^2 (s_j^2/n_j)$$

where:

$\bar{Y}_j$  = the mean number of anglers per count in stratum j,

$H_j$  = total number of hours of fishing possible in stratum j,

$s_j^2$  = the sample variance for angler counts in stratum j, and

$n_j$  = the number of angler counts conducted in stratum j.

The mean effort and mean catch per angler was calculated for each location and time frame using a two-stage random sample design with days as the primary sample units and anglers as the secondary sample units (Von Geldern and Tomlinson 1973). Catch refers to fish kept only. Arithmetic means were calculated from all completed trip anglers interviewed at a location and time frame.

The variance of mean effort was estimated as (Sukhatme et al. 1984):

$$(3) \quad V(\bar{f}) = [1 - (d/D)] s_B^2/d + [\sum_{i=1}^d (s_{wi}^2/m_i)] dD$$

$$s_{wi}^2 = [\sum_{k=1}^{m_i} (f_{ik} - \bar{f}_i)^2] / (m_i - 1),$$

$$s_B^2 = [\sum_{i=1}^d (\bar{f}_i - \bar{F})^2] / (d - 1),$$

where:

d = number of days on which sampling was conducted,

D = number of possible days at a location in a time frame,



$f_{ik}$  - effort by angler k interviewed on day i,

$m_i$  - number of anglers interviewed on day i, and

$\bar{F}$  - mean effort per angler at a location during a time frame.

The variance of mean catch per angler was estimated by substituting individual catches for efforts in the above formulae.

Catch per effort,  $c/f$ , was computed for each location and time frame. The variance of catch per effort is approximated by the variance for a quotient of two random variables (Jessen 1978),

$$(4) \quad \hat{V}(\bar{c}/\bar{f}) = (\bar{c}/\bar{f})^2 [(s_c^2/\bar{c}^2) + (s_f^2/\bar{f}^2) - (2rs_c s_f/\bar{c}\bar{f})]$$

where:

$\bar{c}$  = mean number of coho salmon caught per angler,

$\bar{f}$  = as defined previously,

$s_c^2$  = two-stage variance of  $\bar{c}$ ,

$s_f^2$  = two-stage variance of  $\bar{f}$ , and

$r$  = Pearson's correlation coefficient for the  $c_{ik}$  and  $f_{ik}$ .

Total harvest (T) for each location-time frame was computed as  $\hat{T} = \hat{E}(\bar{c}/\bar{f})$ ; and variance, (Goodman 1960):

$$(5) \quad \hat{V}(T) = [\hat{E}^2 \hat{V}(\bar{c}/\bar{f})] + [\bar{c}/\bar{f}]^2 \hat{V}(\hat{E}) - [\hat{V}(\hat{E}) \hat{V}(\bar{c}/\bar{f})]$$

### Escapement

The Buskin River weir is located 2.0 km upstream of the river mouth at an area approximately 40 m wide. Both river banks at the weir site are steep and the river bottom is predominantly small rock substrate suitable for holding a weir. The weir is constructed of 21 mm diameter aluminum pipe spaced 21 mm apart.

Adult fish counted through the weir gates were identified by species and the daily totals recorded. Spawning pink salmon were counted below the weir. When the coho salmon immigration was nearly completed, the weir was dismantled and a foot survey was conducted to count fish holding below the weir. These estimates were added to the weir count to estimate total escapement.

### Biological Data

Coho salmon from the sport harvest were sampled for age, sex, and size data. Sport-caught fish were sampled when encountered during angler interviews. Salmon in the Buskin River escapement were also initially sampled at the weir, however, efforts indicated that sampled fish suffered a high mortality. Thereafter, the salmon escapement was sampled by beach seining fish in late September. Fish were sampled for scales, sex, and length data. Scales were collected from the preferred area<sup>1</sup> and mounted on a gum card. Permanent scale impressions were made on plastic acetate cards which were read on a microfiche projector.

The percent contribution of each age group to the samples was calculated and a variance estimated using the normal approximation to the binomial (Cochran 1977). Mean lengths and variances were calculated for each age group by sex.

## RESULTS AND DISCUSSION

### Buskin River Creel Survey

An estimated 1,563 coho salmon were harvested during 8,394 angler-hours of effort (Tables 1-3, Appendix Tables A1-A4). Harvests in the early and late fisheries were 458 fish and 1,105 fish, respectively. During the late fishery most of the effort (2,620 angler-hours or 51%) and harvest (673 fish or 60.9%) occurred below the weir. Stratification by weekend/weekday was not possible during the late fishery due to a missed sampling period.

A comparison of relative precision for the effort estimates (Table 3) shows that much of the imprecision in the estimates occurred in the below bridge fishery. The high degree of variability is attributed to the sporadic nature of this fishery; no consistent pattern was obvious for fishing effort. A visual inspection of the mean count data in Table 1 indicates that most of the fishing effort consistently occurred during strata B, C, and D for all fishing locations.

### Portage Creek Creel Survey

Approximately one-third of the angler effort (693 angler-hours) occurred during the weekend fishery and remaining effort (1,279 angler-hours) occurred during the weekday fishery (Table 4 and Appendix Table B1).

Harvest rates for the weekend and weekday fisheries were 0.209 and 0.347 fish per hour, respectively (Table 5 and Appendix Table B2). An estimated 589 coho salmon were harvested during 1,972 angler-hours of effort (Table 6). All of the observed coho salmon harvest came from the

<sup>1</sup> The preferred area is on the left side of the fish, approximately two rows above the lateral line (Koo 1962).

Table 1. Estimated effort in angler-hours during the 1987 Buskin River sport fishery for coho salmon.

Early fishery: 8/10-9/10

Location	Period	Counts			Effort (hours)	
		Mean	SE <sup>1</sup>	SS <sup>2</sup>	Total	SE
Below bridge weekends	A	1.6	0.9	5	29	17
	B	8.2	4.3	5	295	154
	C	16.6	5.0	5	747	223
	D	3.3	1.8	6	150	80
Below bridge weekdays	A	1.0	0.3	8	46	12
	B	4.4	1.4	7	407	128
	C	7.5	1.7	6	863	29
	D	6.5	1.7	11	742	27
TOTAL					3,279	420

Late fishery: 9/11-10/2

Below weir weekends & weekdays <sup>3</sup>	A	6.0	5.3	4	264	235
	B	7.9	2.0	10	695	178
	C	7.0	1.9	10	770	207
	D	8.1	2.8	10	891	310
TOTAL					2,620	476
Above weir weekends & weekdays <sup>3</sup>	A	5.0	3.4	4	220	149
	B	6.6	1.2	10	581	101
	C	7.1	1.0	10	781	108
	D	8.3	1.7	10	913	191
TOTAL					2,495	284
TOTAL late fishery:					5,115	554

<sup>1</sup> Standard error.

<sup>2</sup> Sample size.

<sup>3</sup> Cannot be stratified by weekends and weekdays due to missed sample.

Table 2. Effort and harvest summary statistics for anglers interviewed during the Buskin River sport fishery for coho salmon, 1987.

Time	Location	Int. <sup>1</sup>	D <sup>2</sup>	d <sup>3</sup>	Effort (hours)		Harvest				
					Mean	SE	Mean	SE	r <sup>5</sup>	CPUE <sup>6</sup>	SE
Early Fishery											
8/10-9/10	Below bridge										
	Weekends	218	9	7	1.58	0.117	0.189	0.069	0.195	0.120	0.04
	Weekdays	245	23	13	1.64	0.113	0.249	0.043	0.182	0.151	0.03
Late Fishery											
9/11-10/2	Below weir	161	22	12	1.59	0.112	0.410	0.065	0.383	0.257	0.03
9/11-10/2	Above weir	105	22	15	1.44	0.097	0.248	0.067	0.409	0.173	0.04

1 Number of anglers interviewed.

2 Number of days possible for sampling.

3 Number of days sampled.

4 Standard error.

5 Correlation coefficient between angler effort and harvest.

6 Number of fish retained per hour fished.

Table 3. Estimated effort and harvest during the Buskin River sport fishery for coho salmon, 1987.

Time	Location	Effort Total	Rel. Pre. <sup>1</sup>	CPUE <sup>2</sup>	Rel. Pre.	Harvest Total	SE <sup>3</sup>	Rel. Pre.
Early Fishery:								
8/10-9/10	Below bridge							
	weekends	1,221	45.4%	0.120	70.5%	146	61.4	82.4%
	weekdays	2,058	12.8%	0.151	34.1%	312	71.2	44.7%
	Total	3,279	25.1%			458	44.0	40.2%
Late Fishery:								
9/11-10/2	Below weir	2,620	35.6%	0.257	29.0%	673	150.0	43.7%
9/11-10/2	Above weir	2,495	22.3%	0.173	49.8%	432	118.6	53.8%
	Total	5,115	21.2%			1,105	196.4	34.8%
	Total	8,394	16.4%			1,563	213.1	26.7%

<sup>1</sup> Relative precision for 95% confidence interval.

<sup>2</sup> Catch per angler-hour.

<sup>3</sup> Standard error.

Table 4. Estimated effort in angler-hours during the Portage Creek sport fishery for coho salmon, 1987.

Fishery	No. Counts	No. Days Possible	No. Days Sampled	<u>Counts</u>		<u>Effort</u>	
				Mean	SE <sup>1</sup>	Total	SE
Weekend	30	14	14	3.3	0.7	693	150
Weekday	41	29	17	3.0	0.7	1,279	275
				Total		1,972	313

<sup>1</sup> Standard error.

Table 5. Effort and harvest summary statistics for anglers interviewed during the Portage Creek sport fishery for coho salmon, 1987.

Fishery	No. Int. <sup>1</sup>	D <sup>2</sup>	d <sup>3</sup>	Effort (hours)		Harvest				
				Mean	SE <sup>4</sup>	Mean	SE	r <sup>5</sup>	HPUE <sup>6</sup>	SE
Weekend	63	14	7	4.630	0.334	0.968	0.180	-0.153	0.209	.044
Weekday	72	29	9	4.240	0.847	1.472	0.265	0.679	0.347	.053

<sup>1</sup> Number of anglers interviewed.

<sup>2</sup> Number of days possible for sampling.

<sup>3</sup> Number of days sampled.

<sup>4</sup> Standard error.

<sup>5</sup> Correlation coefficient between angler effort and harvest.

<sup>6</sup> Number of fish retained per hour fished.

Table 6. Estimated effort and harvest during the Portage Creek sport fishery for coho salmon, 1987.

Fishery	Total Effort	Relative Precision	HPUE <sup>1</sup>	Relative Precision	Harvest Total	Standard Error	Relative Precision
Weekend	693	42.4%	0.209	41.1%	145	69.4	93.8%
Weekday	1,279	42.1%	0.347	30.1%	444	116.5	51.4%
Total	1,972	31.0%		Total	589	135.6	45.1%

<sup>1</sup> Number of fish retained per hour fished.



intertidal area of Portage Creek. The weekend fishery harvested 145 coho salmon and 444 fish were harvested by the weekday fishery.

The relative precision for the harvest and effort estimates show a large degree imprecision. Errors in the estimates are attributed to the variability that occurs with lessor, intermittent fisheries. A visual inspection of the mean count data in Table 4 indicates that fishing effort was evenly distributed irrespective of weekends and weekdays.

#### Big Bay Creel Survey

The Big Bay creel survey was inoperable for 9 days during the middle of the coho salmon sport fishery (8/17-8/25).<sup>2</sup> Therefore, the following data are estimates for the given time periods and do not reflect total sport fish estimates. During the creel survey, anglers fished an estimated 427 angler-hours and harvested 378 coho salmon (Table 7-9 and Appendix Tables C1 and C2). The relative precisions for angler effort (42.6%) and harvest (78.2%) are the result of small sample sizes and the sporadic nature of the sport fishery.

#### Pauls Bay, Carry Inlet and Shangin Bay Creel Survey

Unfortunately, the survey clerks in these locations did not follow any sampling schedule.<sup>3</sup> Anglers were simply interviewed on a "time-available" basis and estimates could not be computed with any confidence. For these fisheries, effort and harvest were simply totaled for the interviewed anglers.

The reported angler-effort for Pauls Lake, Carry Inlet, and Shangin Bay was 729.0, 288.5 and 107.0 angler-hours (Table 10), respectively. The largest reported coho salmon harvest came from Pauls Bay (n = 159 fish) while 106 coho salmon were harvested in Carry Inlet and 92 coho salmon in Shangin Bay. The Shuyak Island sport fishery for coho salmon was considered small but excellent as the catch per unit of effort for the above areas ranged 0.218 to 0.860 fish per angler hour (Table 10). Angler characteristics and demographics for Northern Afognak Island, Shuyak Island, and Kodiak Island creel surveys are presented in Appendix Table D1.

#### Buskin River Escapement

Buskin River weir counts from 19 May through 1 October 1987 (Appendix Table E1) totaled 12,883 sockeye salmon, 30,392 pink salmon, 79 chum salmon, and 10,889 coho salmon. A total of 105 emigrant and 29 immigrant steelhead were also counted through the weir, but these counts are incomplete as the weir was removed before the fall steelhead immigration was completed.

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<sup>2</sup> This is a remote, one person station and the survey clerk was called away to other duties at this time.

<sup>3</sup> These surveys were conducted by Division of Commercial Fisheries personnel.

Table 7. Estimated effort in angler-hours during the Big Bay sport fishery for coho salmon, 1987.

Fishery	No. Counts	No. Days Possible	No. Days Sampled	<u>Counts</u>		<u>Effort</u>	
				Mean	SE <sup>1</sup>	Mean	SE
8/8-8/16	18	9	9	1.3	0.4	161	46
8/17-8/25	No data as survey was inoperable for nine days						
8/26-9/23	55	29	24	0.7	0.2	266	80
				Total		427	93

<sup>1</sup> Standard error.

Table 8. Effort and harvest summary statistics for anglers interviewed during the Big Bay sport fishery for coho salmon, 1987.

Fishery	Number of Interviews	D <sup>1</sup>	d <sup>2</sup>	<u>Effort (hours)</u>		<u>Harvest</u>				
				Mean	SE <sup>3</sup>	Mean	SE	r <sup>4</sup>	CPUE <sup>5</sup>	SE
8/8-8/16	16	9	3	2.75	0.304	0.938	0.551	-0.320	0.341	.215
8/17-8/25	No data as the survey was inoperable for nine days									
8/26-9/23	27	29	6	1.89	0.151	2.296	0.656	0.134	1.216	.348

<sup>1</sup> Number of days possible for sampling.

<sup>2</sup> Number of days sampled.

<sup>3</sup> Standard error.

<sup>4</sup> Correlation coefficient between angler effort and harvest.

<sup>5</sup> Number of fish retained per hour fished.

Table 9. Estimated effort and harvest during the Big Bay sport fishery for coho salmon, 1987.

Fishery	Total Effort	Relative Precision	CPUE <sup>1</sup>	Relative Precision	Harvest Total	Standard Error	Relative Precision
8/8-8/16	161	56.0%	0.341	123.8%	55	36.8	131.1%
8/17-8/25	No data as the survey was inoperable for nine days						
8/26-9/23	266	58.9%	1.216	60.6%	323	146.4	88.8%
Total	427	42.6%		Total	378	150.9	78.2%

<sup>1</sup> Number of fish retained per hour fished.

Table 10. Reported effort and harvest during the Pauls Lake, Carry Inlet and Shangin Bay sport fishery for coho salmon, 1987.

Area	Time Period	Angler Hours	Hours/ Angler	CPUE <sup>1</sup>	Harvest Total
Pauls Lake	8/01- 9/05	729.0	3.68	0.218	159
Carry Inlet	8/15- 9/17	288.5	4.12	0.367	106
Shangin Bay	8/16- 9/23	107.0	2.28	0.860	92

<sup>1</sup> Number of fish retained per hour fished.

## Biological Data

### Buskin River:

Ages 2.1<sup>4</sup> and 1.1 coho salmon comprised 73.4% and 24.8% of the sport fishery sample, respectively (Table 11). Males were more abundant than females (44.0% females, 56.0% males). Ages 2.1 and 1.1 coho salmon also composed most of the escapement (78.1% and 19.7%, respectively) (Table 12). Sex composition was nearly equal in the escapement (52.2% females and 47.8% males). Mean lengths for females in the sport fishery ranged from 660 mm (age 1.1) to 692 mm (age 3.1). For males, mean lengths in the sport fishery ranged from 657 mm (age 1.1) to 685 mm (age 2.1) (Table 13). Mean lengths for females in the escapement ranged from 625 mm (age 1.1) to 661 mm (age 3.1). For males, mean lengths in the escapement ranged from 448 mm (age 2.0) to 692 mm (age 3.1) (Table 14).

### Portage Creek:

Ages 2.1, 1.1 and 3.1 coho salmon comprised 82.2%, 10.1% and 5.3% of the sport fishery sample, respectively (Table 15). Males were more abundant than females (40.8% females, 59.2% males). Mean lengths by sex and age group ranged from 355 mm for age 2.0 males to 656 mm for age 3.1 males (Table 16)

### Big Bay:

Ages 2.1, 1.1 and 3.1 coho salmon comprised 34.3%, 54.3% and 11.4% of the sport fishery sample, respectively (Table 17). Males and females were nearly equally abundant (48.6% females, 51.4% males). Mean lengths by sex and age group ranged from 620 mm for age 3.1 to 624 mm for age 2.1 and 1.1 males while females ranged from 615 mm for age 3.1 to 619 mm for age 1.1 (Table 18).

### Pauls Bay:

Ages 2.1, 3.1, and 1.1 coho salmon comprised 65.4%, 19.2%, and 15.4% of the sport fishery sample, respectively (Table 19). Males were much more abundant than females (61.5% males, 38.5% females).

## RECOMMENDATIONS

The primary objective of the work on Afognak and Shuyak Islands was to obtain some more specific fishery information for the major coho salmon fisheries in this area than is available through Mills (1977-1987). Of particular interest were estimates of the magnitude of the harvests. Although technical problems occurred with most of the estimates, the total harvest for the Afognak and Shuyak Island fisheries (1,324 fish, Table 20)

<sup>4</sup> European formula: the first numeral refers to the number of years of freshwater residence. The second numeral refers to the number of years of marine residence. Total age is the sum of both numbers plus one.

Table 11. Age composition of coho salmon in the Buskin River sport harvest, 1987.

	Age Group				
Sex	3.1	2.1	2.0	1.1	Total <sup>1</sup>
<hr/>					
Female					
Sample Size	2	32	0	14	48
Percent	1.8	29.4	0.0	12.8	44.0
Male					
Sample Size	0	48	0	13	61
Percent	0.0	44.0	0.0	11.9	56.0
Sexes Combined					
Sample Size	2	80	0	27	109
Percent	1.8	73.4	0	24.8	100.0
Standard Error	1.3	4.3	0	4.2	

<sup>1</sup> Of the 125 fish sampled, 16 (12.8%) had unreadable scales.

Table 12. Age composition of coho salmon in the Buskin River escapement, 1987.

	Age Group				
Sex	3.1	2.1	2.0	1.1	Total <sup>1</sup>
<hr/>					
Female					
Sample Size	5	174	0	38	217
Percent	1.2	41.8	0.0	9.1	52.2
Male					
Sample Size	3	151	1	44	199
Percent	0.7	36.3	0.2	10.6	47.8
Sexes Combined					
Sample Size	8	325	1	82	416
Percent	1.9	78.1	0.2	19.7	100.0
Standard Error	0.7	2.0	0.2	2.0	

<sup>1</sup> Of the 460 fish sampled, 44 (9.6%) had unreadable scales.



Table 13. Mean length (mm) of coho salmon in the Buskin River sport harvest, 1987.<sup>1</sup>

Sex	Age Group <sup>2</sup>			
	3.1	2.1	2.0	1.1
Female				
Mean Length	692	660	---	660
Standard Error	5	11	---	10
Sample Size	2	32	0	14
Male				
Mean Length	---	685	---	657
Standard Error	---	6	---	13
Sample Size	0	48	0	13

<sup>1</sup> Mid-eye to fork-of-tail length.

<sup>2</sup> Sixteen fish had unreadable scales.

Table 14. Mean length (mm) of coho salmon in the Buskin River escapement, 1987.<sup>1</sup>

Sex	Age Group <sup>2</sup>			
	3.1	2.1	2.0	1.1
Female				
Mean Length	661	660	---	625
Standard Error	11	2	---	6
Sample Size	5	174	0	38
Male				
Mean Length	692	662	448	638
Standard Error	32	3	0	7
Sample Size	3	151	1	44

<sup>1</sup> Mid-eye to fork-of-tail length.

<sup>2</sup> Forty-four fish had unreadable scales.

Table 15. Age composition of coho salmon in the Portage Creek sport harvest, 1987.<sup>1</sup>

Sex	Age Group					Total
	3.1	3.0	2.1	2.0	1.1	
Female						
Sample	3	0	60	0	6	69
Percent	1.8	0.0	35.5	0.0	3.6	40.8
Male						
Sample Size	6	3	79	1	11	100
Percent	3.6	1.8	46.7	0.6	6.6	59.2
Sexes Combined						
Sample Size	9	3	139	1	17	169
Percent	5.3	1.8	82.2	0.6	10.1	100.0
Standard Error						

<sup>1</sup> Of the 177 fish sampled, 8 (4.5%) had unreadable scales.

Table 16. Mean length (mm) of coho salmon in the Portage Creek sport harvest, 1987.<sup>1</sup>

Sex	Age Group <sup>2</sup>				
	3.1	3.0	2.1	2.0	1.1
Female					
Mean Length	600	---	628	---	592
Standard Error	20.2		4.7	---	18.7
Sample Size	3		60	0	6
Male					
Mean Length	656	368	634	355	620
Standard Error	12.7	18.6	5.1	0	13.5
Sample Size	6	3	79	1	11

<sup>1</sup> Mid-eye to fork-of-tail length.

<sup>2</sup> Of the 177 fish sampled, 8 (4.5%) had unreadable scales.

Table 17. Age composition of coho salmon in the Big Bay sport harvest, 1987.

Sex	Age Group					Total
	3.1	3.0	2.1	2.0	1.1	
Female						
Sample	2	0	6	0	9	17
Percent	5.7		17.1		25.7	48.6
Male						
Sample Size	2	0	6	0	10	18
Percent	5.7		17.1		28.6	51.4
Sexes Combined						
Sample Size	4	0	12	0	19	35
Percent	11.4	0	34.3	0	54.3	100.0
Standard Error	5.5	0	0.4	0	10.2	

Table 18. Mean length (mm) of coho salmon in the Big Bay sport harvest, 1987.<sup>1</sup>

Sex	Age Group				
	3.1	3.0	2.1	2.0	1.1
Female					
Mean Length	615		617		619
Standard Error	7.0		7.3		7.3
Sample Size	2	0	6		9
Male					
Mean Length	620		624	---	624
Standard Error	9.1		9.8	---	7.4
Sample Size	2		6	0	10

<sup>1</sup> Mid-eye to fork-of-tail length.

Table 19. Age composition of coho salmon in the Pauls Bay sport harvest, 1987.<sup>1</sup>

Sex	Age Group					Total
	3.1	3.0	2.1	2.0	1.1	
Female						
Sample	1		7		2	10
Percent	3.8		26.9		7.7	38.5
Male						
Sample Size	4		10		2	16
Percent	15.4		38.5		7.7	61.5
Sexes Combined						
Sample Size	5		17		4	26
Percent	19.2		65.4		15.4	100.0
Standard Error	7.7		9.5		7.5	

<sup>1</sup> Of the 34 fish sampled, 8 (23.5%) had unreadable scales.

Table 20. Comparison of estimates of harvest and escapement, 1987.

<u>Creel Survey</u>			<u>Mail Survey</u> <sup>2</sup>	
Location	Harvest	Escapement	Location	Harvest
Portage Creek	589	3,500 <sup>1</sup>	Boat-Afognak Island Area	3,459
Big Bay	378		Boat-Other	308
Paul's Lake	159	6,000 <sup>1</sup>	Shoreline-Afognak Island Area	706
Carry Inlet	106		Shoreline	544
Shangin Bay	92			
Total	1,324	N/A		5,017
Buskin River	1,563	10,889		3,133

<sup>1</sup> Manthey (1987)

<sup>2</sup> Mills (1988)



certainly serves as an order of magnitude estimator. Total harvest in these fisheries is in the range of low thousands of fish: not hundreds of fish nor tens of thousands of fish. On an individual fishery basis, the Buskin River fishery (1,563 fish) is roughly of the magnitude of all of these fisheries combined (Table 20).

Mail survey data for 1987 (Mills 1988) estimates total saltwater harvest for Afognak Island and other Kodiak Island locations outside of Chiniak Bay (Figure 1) at 5,017 coho salmon (Table 20). While the precision of this estimate is not reported, we again feel confident that this serves as an order of magnitude estimator and that total harvest for these fisheries is likely in the range of thousands of fish. Both of these independent estimators show these fisheries to be extremely small in terms of harvest. When combined with estimates of escapement (Manthey 1987, Table 20), these fisheries would appear to have a negligible impact on the stocks in question. A similar case can be made for the Buskin River sport fishery (Table 20).

Results of the coho salmon creel surveys were provided to the Board of Fisheries to aid in their consideration of regulatory proposals at the March 1988 meeting. Coho salmon regulatory proposals submitted by Department staff were: 1) reduction of the Kodiak road system possession limit from four to two fish (508 mm or greater in length); 2) reduction of Kodiak remote area bag limit from six to five fish and the possession limit from 12 to five fish; and 3) the inclusion of all saltwater areas within 1 mile of land between Anton Larsen Bay and Saltery Cove into the road system zone. The Board adopted these proposals to reduce the potential over exploitation of coho salmon stocks in future years and to simplify the regulation by including all saltwater areas on the road system under a uniform, two-fish bag limit.

#### ACKNOWLEDGEMENTS

The assistance of Mr. Michael Mortensen is gratefully acknowledged.

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## APPENDIX TABLES

Appendix Table A1. Angler counts in the Buskin River coho salmon sport fishery, 10 August through 10 September, 1987.

Date	Weekend/ Holiday (+)	Counts by Period <sup>1</sup>			
		A	B	C	D
10-Aug			6		3
11-Aug			0		3
12-Aug		2		3	6
13-Aug					
14-Aug					
15-Aug	+	5	7		
16-Aug	+		2	10	11
17-Aug					
18-Aug		1			3
19-Aug		0	3		
20-Aug					
21-Aug		1		11	2
22-Aug	+		3		2
23-Aug	+	0		5	1
24-Aug		1			3
25-Aug			4		
26-Aug					
27-Aug		0	1	4	11
28-Aug					
29-Aug	+				
30-Aug	+	2	4	12	6
31-Aug					
01-Sept				4	8
02-Sept					
03-Sept			6	12	0
04-Sept		1			
05-Sept	+	1		24	0
06-Sept	+	0	25	32	0
07-Sept	+				
08-Sept					
09-Sept				11	13
10-Sept		2	11		19

<sup>1</sup> Period A: 0600-0759, period B: 0800-1159, period C: 1200-1659, period D: 1700-2200.

Appendix Table A2. Angler counts in the Buskin River coho salmon sport fishery, 11 September through 2 October, 1987.

Date	Weekend/ Holiday (+)	Counts by period <sup>1</sup> <u>Below weir fishery</u>				Counts by period <sup>1</sup> <u>Above weir fishery</u>			
		A	B	C	D	A	B	C	D
11-Sept				15	32			11	20
12-Sept	+	22			8	15			10
13-Sept	+								
14-Sept			8	11			5	6	
15-Sept									
16-Sept		1	8		10	3	4		7
17-Sept			13				7		
18-Sept									
19-Sept	+		19	9	9		8	5	4
20-Sept	+		16	18			11	13	
21-Sept									
22-Sept		0		2	5	2		8	10
23-Sept				4	2			8	3
24-Sept									
25-Sept			2	2	7		6	4	2
26-Sept	+				4				7
27-Sept	+		7	5	1		13	4	14
28-Sept			5	3			7	8	
29-Sept									
30-Sept		1	0			0	0		
01-Oct									
02-Oct			1	1	3		5	4	6

<sup>1</sup> Period A: 0700-0759, period B: 0800-1159, period C: 1200-1659, period D: 1700-2100.

Appendix Table A3. Angler effort and harvest data for the Buskin River coho salmon sport fishery, 10 August through 10 September 1987.

Date	Wd/ We	No. Int. <sup>1</sup>	Hours		Coho Harvest			Pink Harvest		
			Mean	SE <sup>2</sup>	Mean	SE	CPUE	Mean	SE	CPUE
10-Aug	Wd	9	0.9	0.21	0.00	0.000	0.000	0.00	0.000	0.000
11-Aug	Wd	12	2.2	0.29	0.00	0.000	0.000	0.17	0.112	0.075
12-Aug	Wd	22	1.2	0.23	0.00	0.000	0.000	0.32	0.179	0.264
15-Aug	We	12	1.5	0.21	0.00	0.000	0.000	0.00	0.000	0.000
16-Aug	We	32	2.0	0.24	0.00	0.000	0.000	0.25	0.100	0.126
18-Aug	Wd	13	1.3	0.23	0.08	0.077	0.061	0.08	0.077	0.061
19-Aug	Wd	4	1.8	0.66	0.00	0.000	0.000	0.75	0.750	0.429
21-Aug	Wd	19	1.1	0.13	0.00	0.000	0.000	0.05	0.053	0.049
22-Aug	We	5	1.4	0.24	0.40	0.400	0.286	0.00	0.000	0.000
23-Aug	We	14	0.9	0.10	0.00	0.000	0.000	0.00	0.000	0.000
24-Aug	Wd	7	0.4	0.11	0.00	0.000	0.000	0.00	0.000	0.000
25-Aug	Wd	7	1.5	0.19	0.14	0.143	0.095	0.00	0.000	0.000
27-Aug	Wd	30	2.1	0.20	0.33	0.111	0.161	0.03	0.033	0.016
30-Aug	We	36	1.3	0.15	0.11	0.065	0.082	0.00	0.000	0.000
01-Sept	Wd	24	1.8	0.16	0.29	0.112	0.158	0.00	0.000	0.000
03-Sept	Wd	37	1.7	0.14	0.32	0.110	0.192	0.03	0.027	0.016
05-Sept	We	48	1.6	0.14	0.46	0.099	0.289	0.00	0.000	0.000
06-Sept	We	70	1.7	0.13	0.19	0.059	0.110	0.00	0.000	0.000
09-Sept	Wd	27	1.5	0.11	0.48	0.145	0.323	0.00	0.000	0.000
10-Sept	Wd	34	2.2	0.20	0.50	0.121	0.227	0.00	0.000	0.000

<sup>1</sup> Number of anglers interviewed.

<sup>2</sup> Standard error.



Appendix Table A4. Angler effort and harvest data for the Buskin River coho salmon sport fishery, 11 September through 2 October 1987.

Date	Wd/ We	No Int. <sup>1</sup>	<u>Hours</u>		<u>Coho Harvest</u>			<u>Pink Harvest</u>		
			Mean	SE <sup>2</sup>	Mean	SE	CPUE	Mean	SE	CPUE
Location: Below Weir										
11-Sept	Wd	15	1.8	0.19	0.73	0.228	0.415	0.00	0.000	0.000
12-Sept	We	24	1.6	0.17	0.58	0.169	0.368	0.00	0.000	0.000
14-Sept	Wd	18	1.3	0.16	0.22	0.101	0.174	0.00	0.000	0.000
16-Sept	Wd	22	2.7	0.43	0.68	0.153	0.256	0.00	0.000	0.000
19-Sept	We	22	1.1	0.14	0.14	0.075	0.122	0.00	0.000	0.000
20-Sept	We	16	1.8	0.18	0.50	0.204	0.276	0.00	0.000	0.000
22-Sept	Wd	3	1.1	0.51	0.00	0.000	0.000	0.00	0.000	0.000
23-Sept	Wd	4	1.4	0.38	0.25	0.250	0.182	0.00	0.000	0.000
25-Sept	Wd	11	1.1	0.19	0.27	0.195	0.250	0.00	0.000	0.000
27-Sept	We	14	1.8	0.15	0.36	0.133	0.204	0.00	0.000	0.000
28-Sept	Wd	10	0.9	0.17	0.10	0.100	0.108	0.00	0.000	0.000
02-Oct	Wd	2	1.3	0.25	0.50	0.500	0.400	0.00	0.000	0.000
Location: Above Weir										
11-Sept	Wd	5	2.0	0.00	0.00	0.000	0.000	0.20	0.200	0.100
12-Sept	We	8	1.5	0.19	0.75	0.250	0.500	0.00	0.000	0.000
14-Sept	Wd	6	1.1	0.29	0.00	0.000	0.000	0.00	0.000	0.000
16-Sept	Wd	8	1.1	0.21	0.13	0.125	0.115	0.00	0.000	0.000
17-Sept	Wd	7	2.0	0.42	0.86	0.404	0.429	0.00	0.000	0.000
19-Sept	We	10	0.8	0.17	0.10	0.100	0.128	0.00	0.000	0.000
20-Sept	We	5	1.3	0.30	0.60	0.400	0.462	0.00	0.000	0.000
22-Sept	Wd	9	1.2	0.23	0.44	0.294	0.381	0.00	0.000	0.000
23-Sept	Wd	3	1.3	0.33	0.00	0.000	0.000	0.00	0.000	0.000
25-Sept	Wd	2	0.5	0.00	0.50	0.500	1.000	0.00	0.000	0.000
26-Sept	We	9	1.3	0.19	0.00	0.000	0.000	0.00	0.000	0.000
27-Sept	We	10	1.4	0.20	0.00	0.000	0.000	0.00	0.000	0.000
28-Sept	Wd	9	1.4	0.15	0.11	0.111	0.077	0.00	0.000	0.000
30-Sept	Wd	7	2.9	0.46	0.43	0.297	0.150	0.00	0.000	0.000
02-Oct	Wd	7	1.6	0.20	0.00	0.000	0.000	0.00	0.000	0.000

<sup>1</sup> Number of anglers interviewed.

<sup>2</sup> Standard error.

Appendix Table B1. Angler Counts in the Portage  
Creek coho salmon sport fishery  
9 August through 20 September,  
1987.

Date	WD/ WE <sup>1</sup>	Counts by Period <sup>2</sup>		
		A	B	C
8/09	WE			7
8/10	WD			2
8/11	WD			
8/12	WD	2	13	3
8/13	WD			
8/14	WD	4	7	8
8/15	WE		7	
8/16	WE	11		7
8/17	WD	6	3	0
8/18	WD	0	1	
8/19	WD	0	14	16
8/20	WD			
8/21	WD			
8/22	WE		11	
8/23	WE	6	8	2
8/24	WD			
8/25	WD	0	7	4
8/26	WD	0	4	
8/27	WD			
8/28	WD	0		0
8/29	WE	0	0	2
8/30	WE	14		0
8/31	WD			
9/01	WD		0	0
9/02	WD	0	4	0
9/03	WD	0	9	0
9/04	WD			
9/05	WE	0	2	
9/06	WE	9	3	0
9/07	WE		10	2
9/08	WD			
9/09	WD			
9/10	WD	0	4	2
9/11	WD	4		4
9/12	WE	0	0	0
9/13	WE	0		0
9/14	WD			
9/15	WD	0	0	
9/16	WD	0	0	
9/17	WD			
9/18	WD	0	0	
9/19	WE	0	0	0
9/20	WE	0		0

<sup>1</sup> WD - Weekday; WE = Weekend/Holiday

<sup>2</sup> Period A: 0700-0759 hrs, Period B: 0800-1159 hrs,  
Period C: 1200-1659 hrs, Period D: 1700-2100 hrs.

Appendix Table B2. Angler effort and harvest data for the Portage Creek coho salmon sport fishery, 12 August through 11 September, 1987.

Date	Wd/ We	No. Int. <sup>1</sup>	<u>Hours</u>		<u>Coho Harvest</u>			<u>Pink Harvest</u>		
			Mean	SE <sup>2</sup>	Mean	SE	CPUE	Mean	SE	CPUE
12-Aug	Wd	4	3.0	0.00	0.25	0.250	0.083	0.00	0.000	0.000
14-Aug	Wd	4	11.3	5.64	3.25	1.601	0.289	0.50	0.500	0.044
15-Aug	We	16	4.8	0.67	0.69	0.218	0.143	0.06	0.063	0.013
16-Aug	We	10	2.8	0.13	0.20	0.133	0.071	0.10	0.100	0.036
17-Aug	Wd	6	2.5	0.00	1.83	0.167	0.733	1.50	0.671	0.600
19-Aug	Wd	30	3.6	0.29	1.50	0.262	0.414	0.10	0.056	0.028
22-Aug	We	9	4.7	0.33	1.44	0.338	0.310	0.00	0.000	0.000
23-Aug	We	8	4.3	0.16	1.00	0.327	0.235	0.00	0.000	0.000
25-Aug	Wd	12	5.3	0.33	1.17	0.241	0.222	0.00	0.000	0.000
02-Sept	Wd	2	2.0	0.00	1.00	0.000	0.500	0.00	0.000	0.000
03-Sept	Wd	3	3.0	0.00	1.33	0.333	0.444	0.33	0.333	0.111
05-Sept	We	5	1.8	0.30	2.00	0.707	1.111	0.00	0.000	0.000
06-Sept	We	12	7.0	0.00	1.00	0.000	0.143	0.50	0.261	0.071
07-Sept	We	3	6.0	0.00	1.67	0.667	0.278	0.00	0.000	0.000
10-Sept	Wd	4	6.0	0.00	0.50	0.289	0.083	0.00	0.000	0.000
11-Sept	Wd	7	3.5	0.73	2.00	0.535	0.571	0.00	0.000	0.000

<sup>1</sup> Number of anglers interviewed.

<sup>2</sup> Standard error.

Appendix Table C1. Angler counts in the Big Bay coho salmon sport fishery, 8 August through 16 August and 26 August through 23 September, 1987.

Date	Weekend/ Holiday (+)	Counts by Period <sup>1</sup>		
		A	B	C
08-Aug	+		1	2
09-Aug	+		0	
10-Aug		0		3
11-Aug				1
12-Aug		2	0	2
13-Aug		0		
14-Aug		0	0	
15-Aug	+	2	2	6
16-Aug	+	0	2	0
No count 8/17-8/25 as the survey was inoperable				
26-Aug		0	1	0
27-Aug				1
28-Aug		0	2	0
29-Aug	+	0	0	1
30-Aug		0		
31-Aug				0
01-Sept			0	0
02-Sept		0	0	0
03-Sept		0	0	0
04-Sept				
05-Sept	+	0	2	0
06-Sept			0	0
07-Sept			0	0
08-Sept				
09-Sept				
10-Sept		0	0	0
11-Sept		5		3
12-Sept	+	0	5	4
13-Sept	+	3		0
14-Sept				
15-Sept		0	0	0
16-Sept		3	0	0
17-Sept				
18-Sept		0	0	0
19-Sept	+	0	0	
20-Sept		0		0
21-Sept			0	0
22-Sept			0	0
23-Sept			6	

<sup>1</sup> Period A: 0700-1059, period B: 1100-1559, period C: 1600-2100.

Appendix Table C2. Angler effort and harvest data for the Big Bay  
coho salmon sport fishery, 8 August through  
15 August and 28 August through 16 September 1987.

Date	Wd/ We	No. Int. <sup>1</sup>	Hours		Coho Harvest		
			Mean	SE <sup>2</sup>	Mean	SE	CPUE
08-Aug	We	2	2.0	0.00	2.50	0.500	1.250
12-Aug	Wd	4	2.5	0.29	0.75	0.479	0.300
15-Aug	We	10	3.0	0.60	0.70	0.335	0.233
No interviews 8/17-8/25 as the survey was inoperable							
28-Aug	Wd	2	2.0	0.00	0.00	0.000	0.000
06-Sept	We	2	1.0	0.00	2.00	0.000	2.000
11-Sept	Wd	8	2.0	0.00	4.88	0.666	2.438
12-Sept	We	9	1.9	0.35	0.67	0.289	0.353
13-Sept	We	3	2.0	0.00	3.00	0.577	1.500
16-Sept	Wd	3	2.0	0.00	1.33	0.333	0.667

- <sup>1</sup> Number of anglers interviewed  
<sup>2</sup> Standard error

Appendix Table D1. Characteristics of Buskin River, Portage Creek, Big Bay, Pauls Bay, Carry Inlet and Shangin Bay sport fishery for coho salmon 1987.

Angler Demographics										
Area	Females (%)	Males (%)	Adults (%)	Youth (%)	Non- residents (%)	Residents (%)	Tourist (%)	Non-local (%)	Military (%)	Unguided (%)
Buskin River	14.7	85.3	89.2	10.8	21.7	78.3	12.9	9.5	21.8	100.0
Portage Creek	6.6	93.4	99.3	0.7	73.0	27.0	...	...	0.0	54.1
Big Bay	44.7	55.3	100.0	0.0	36.2	63.8	36.2	100.0	2.1	58.3
Pauls Bay	...	...	...	...	82.8	17.2	...	83.1	...	39.1
Carry Inlet	2.9	97.1	97.1	2.9	58.6	41.4	...	92.9	0.0	84.3
Shangin Bay	34.0	66.0	95.6	4.3	27.7	72.3	...	97.9	0.0	91.5

Angler Success, Harvest Data and Type of Lure

Area	Successful anglers (%)	Unsuccessful anglers (%)	Percent of Catch		Type of lure (%)		
			Released	Retained	Bait	Spinner	Flies
Buskin River	26.5	73.5	15.1	84.9	11.4	86.3	2.3
Portage Creek	90.8	9.2	27.8	72.2	18.1	84.6	18.4
Big Bay	69.4	30.6	10.1	89.9	0.0	100.0	0.0
Pauls Bay	57.5	42.5	22.4	77.6	...	...	...
Carry Inlet	94.4	5.6	71.9	28.1	7.1	77.1	34.3
Shangin Bay	97.9	2.1	64.1	35.9	0.0	100.0	0.0

Appendix Table E1. Buskin River salmon escapement by day and species, 1987.

Date	Sockeye	Pink	Coho	Date	Sockeye	Pink	Coho	Date	Sockeye	Pink	Coho	Date	Sockeye	Pink	Coho	Date	Sockeye	Pink	Coho
5/19	27			6/20	209			7/22	49	101		8/23	40	360	22	9/24	0	0	475
5/20	119			6/21	338			7/23	13	30		8/24	60	856	56	9/25	0	0	157
5/21	5			6/22	187			7/24	16	46		8/25	22	497	81	9/26	0	0	279
5/22	5			6/23	---			7/25	49	154		8/26	40	602	39	9/27	0	0	71
5/23	0			6/24	---			7/26	197	127		8/27	15	199	34	9/28	0	0	66
5/24	0			6/25	---			7/27	37	159		8/28	10	214	18	9/29	0	0	79
5/25	0			6/26	---			7/28	50	178		8/29	10	433	21	9/30	0	0	85
5/26	0			6/27	---			7/29	178	346		8/30	27	402	19	10/1	0	0	25
5/27	8			6/28	---			7/30	42	727		8/31	6	230	11	Total <sup>1</sup> 5,551 <sup>2</sup> 27,892 <sup>3</sup> 11,103 <sup>4</sup>			
5/28	2			6/29	---			7/31	40	1,244		9/01	2	439	12				
5/29	0			6/30	---			8/01	70	1,494		9/02	9	554	51				
5/30	14			7/01	3			8/02	33	864		9/03	8	331	29				
5/31	14			7/02	37	1		8/03	39	1,378	1	9/04	3	333	13				
6/01	1			7/03	105	2		8/04	54	1,117	0	9/05	0	273	16				
6/02	0			7/04	4	1		8/05	19	926	1	9/06	2	933	448				
6/03	1			7/05	2	0		8/06	16	781	0	9/07	60	692	960				
6/04	0			7/06	3	0		8/07	15	928	3	9/08	0	30	614				
6/05	0			7/07	26	1		8/08	15	693	0	9/09	344	306	1,860				
6/06	3			7/08	3	0		8/09	56	771	0	9/10	15	110	704				
6/07	215			7/09	1	4		8/10	64	661	5	9/11	0	23	598				
6/08	241			7/10	62	0		8/11	181	2,135	4	9/12	0	5	120				
6/09	80			7/11	41	2		8/12	60	1,208	10	9/13	0	21	250				
6/10	600			7/12	8	2		8/13	18	731	9	9/14	0	3	184				
6/11	---			7/13	7	3		8/14	10	394	3	9/15	8	34	290				
6/12	---			7/14	13	2		8/15	11	214	6	9/16	7	57	1,037				
6/13	---			7/15	117	13		8/16	7	251	8	9/17	2	12	504				
6/14	---			7/16	19	6		8/17	6	261	1	9/18	2	5	336				
6/15	53			7/17	25	17		8/18	28	229	15	9/19	10	3	506				
6/16	311			7/18	8	6		8/19	26	346	2	9/20	3	0	393				
6/17	168			7/19	11	7		8/20	25	481	13	9/21	1	0	119				
6/18	168			7/20	14	41		8/21	18	409	23	9/22	0	0	200				
6/19	97			7/21	12	35		8/22	16	405	13	9/23	0	0	250				

<sup>1</sup> A total of 79 chum salmon, 105 kelt steelhead and 29 immigrant steelhead moved through the weir during August-September, May-August and September, respectively.

<sup>2</sup> Estimated sockeye escapement was 12,883 fish; i.e., 10,500 RS in lake 7/21/87, via aerial survey plus 2,385 RS through weir after 7/14/87 (7 days allowed for migration from weir to lake). Note, weir was inoperable for 12 days in June.

<sup>3</sup> Approximately 2,500 pink salmon spawned below the weir, therefore, the actual escapement was 30,392 fish.

<sup>4</sup> Approximately 400 coho salmon were below the weir when it was removed, the sport harvest above the weir was 614 fish; therefore, total coho salmon escapement was 10,889 fish.

